

Three New *Anemias* from Northern South America

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Of the over 100 species of *Anemia*, about 65 are found in southern and eastern Brazil with a secondary center of speciation in Mexico (20 species). Central America and the western and northern portions of South America have provided relatively few species, those being mostly very widespread taxa. Apparently this is a misleading picture since we here report three new species from northern South America—one from northern Brazil and two from essentially a single locality near Puerto Ayacucho in southern Venezuela. All three species are known from single collections and were found among granite rocks. It would seem that these areas have not been well collected, and since *Anemia* generally favors grassy and/or rocky habitats, there may be additional taxa yet to be discovered in southern Venezuela and Colombia and northern Brazil.

Anemia antrorsa Mickel, sp. nov. (Figs. 1G-I).—TYPE: Brazil, Amazonas, lower slopes of Pico Rondon, Perimetral Norte Highway Km 211, 3 km from Km 211, granite rock outcrop, 2 Feb 1984, Prance et al. 28739 (holotype NY; isotype UC).

Anemiam tomentosam var. *australem* Mickel forma laminae simulans sed pinnis fertilibus brevibus antrorsis falcatis et laminae pilis contortis discreta. (L., *antrorsus*, directed upward, referring to the habit of the fertile pinnae.)

Rhizome horizontal, compact, ca. 6 mm diam., with brownish-yellow hairs, 5-8 mm long; fronds erect, sterile and fertile fronds alike, 28-34 cm long; stipe slightly less than half the sterile frond length and slightly more than half the fertile frond length, densely hirsute with orange hairs 3-5 mm long; blade deltate-ovate, 15-17 cm long, 8-10 cm broad, bipinnate-pinnatifid, lamina papyraceous, dull, pilose on both surfaces with multicellular hairs 0.5-1.0 mm long (twisted on abaxial surface), densely tomentose on rachillae, lower surfaces and rachis; sterile pinnae 9-12 pairs, subsessile (petiolules 1-2 mm), upper pinnae perpendicular to the rachis, lower pinnae slightly ascending, 5-7 pinnules per pinna, the lower pinnae slightly more exaggerated basiscopically, lobes acute to obtuse, margin entire to crenulate; veins free, evident; fertile pinnae remote from the sterile pinnae, ca. half as long as the adjacent sterile pinnae, ascending at 55° angle to strongly upwardly falcate, short-petiolulate (3-4 mm), the ultimate divisions with narrow laminar tissue; spores tetrahedral, vertically compressed, striate, the ridges broad with narrow grooves between, 69-79 (av. 76.1) μ m diam. (Figs. 2A, B).

This species bears a strong resemblance to *A. tomentosa* var. *australis* Mickel, but *A. antrorsa* is quite distinct with its short, suberect pinnae, strongly hairy stipe and rachis, and twisted abaxial laminar hairs. Such habit for fertile pinnae is otherwise well known in the genus, occurring in all three subgenera: subg.



FIG. 1. Habit and details of three *Anemia* species. A-C. *Anemia ayacuchensis*. D-F. *Anemia porrecta*. G-I. *Anemia antrorsa*.

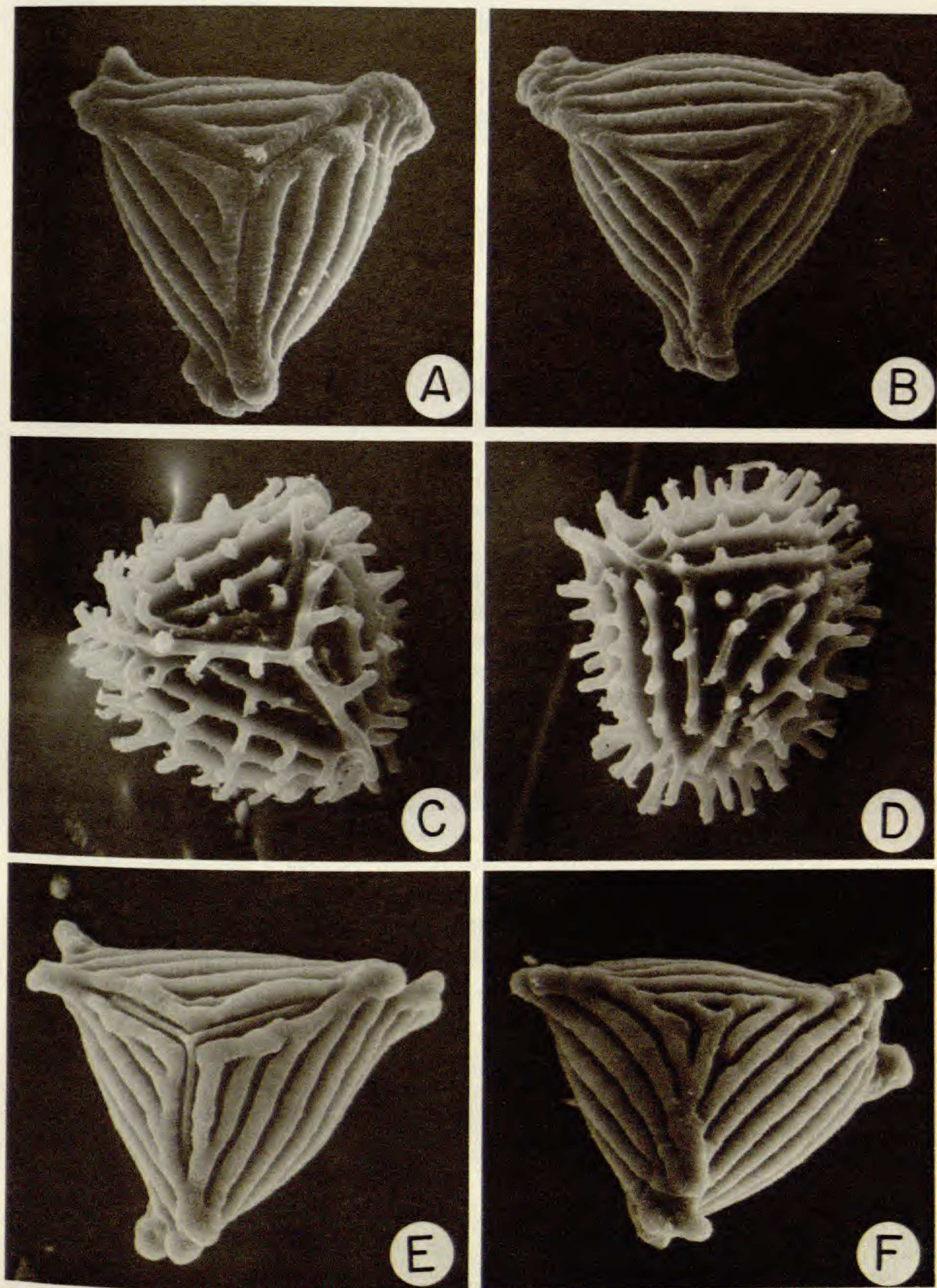


FIG. 2. Spores of *Anemia*. A, B. Proximal and distal faces of *A. antrorsa*, $\times 467$. C, D. Proximal and distal faces of *A. ayacuchensis*, $\times 600$. E, F. Proximal and distal faces of *A. porrecta*, $\times 467$.

Coptophyllum (sect. *Anemibotrys*: *A. aspera*, *A. perrieriana*; sect. *Trochopteris*: *A. elegans*, *A. eximia*), subg. *Anemiorrhiza* (*A. colimensis*), and subg. *Anemia* (sect. *Adetostoma*: *A. brandegeea*, *A. clinata*, *A. intermedia*, *A. salvadorensis*). This is the first report for sect. *Tomentosae* of subg. *Coptophyllum*.

Anemia ayacuchensis Mickel, sp. nov. (Figs. 1A-C).—TYPE: Venezuela, Amazonas, 8 km S of Puerto Ayacucho and just S of the Río Carinagua, savannas between the Río Orinoco and the road, growing at base of boulders, 90 m, 31 Oct 1971, Davidse 2740 (holotype UC; isotype MO, not seen).

Ab. *A. jaliscana* Maxon sporis spinosis atque rhizomatis pilis cupreis differt.

Rhizome horizontal, compact, 6 mm diam., hairs reddish-orange; fronds erect, sterile fronds 10–16 cm tall, fertile frond 24 cm tall; stipe 0.5 mm diam., $\frac{1}{3}$ – $\frac{1}{2}$ of the sterile frond length, ca. $\frac{5}{6}$ of the fertile frond length, stramineous, glabrescent; blade oblong (7 cm long, 2.8–3.6 cm broad), once pinnate, texture papyraceous; pinnae 5–6 pairs, apical pinna obtuse with one (less commonly two) large lateral lobes; pinnae opposite, oblong, truncate to cuneate at base, hirsute on both surfaces, obtuse at apex; margin minutely denticulate; veins free; fertile pinnae erect, long-petiolulate, approximate to the sterile pinnae, far surpassing the sterile blade in height, the ultimate divisions lacking lamina; spores tetrahedral-globose, striate, the ridges narrow with clavate spines, 65–70 (av. 67.8) μ m diam. (Figs. 6, 7).

This is amazingly similar to *A. jaliscana* Maxon of western Mexico (see Mickel, 1982), but is distinct in its spore ridges being spiny (rather than smooth) and the rhizome hairs reddish orange (rather than brownish yellow).

Anemia porrecta Mickel, sp. nov. (Figs. 1D-F).—TYPE: Venezuela, Amazonas, along road from Puerto Ayacucho to Samariapo near crossing with Río Cataniapa, savanna and granite dome, on wet granite rock in dense shade of other rock, 31 July 1967, Wessels Boer 1922 (holotype NY).

Lamina deltata, segmentis rotundatis vel ovatis, et pinnis fertilibus angulo 45° rigide adscendentibus insignis. (L., *porrectus*, stretched out in a straight line, alluding to the habit of the fertile pinnae.)

Rhizome horizontal, compact, 5–6 mm diam., hairs brownish orange; fronds erect, sterile and fertile fronds alike, 9–21 cm tall; stipe 0.6–0.8 mm diam., ca. $\frac{1}{2}$ of the frond length, stramineous, hirsute; blade deltate, 5–10 cm long, 3.3–8.0 cm broad, pinnate to bipinnate-pinnatifid, texture papyraceous; pinnae 5–7 pairs, slightly ascending, apex pinnatifid, pinnae opposite to subopposite, short-petiolulate (1–2 mm), anadromous, 4–6 pairs of pinnules, pinnules and their lobes somewhat rounded or ovate, acute to obtuse, margin shallowly crenulate, hirsute on both surfaces, most densely so on lower surface of costules; veins free; fertile pinnae held rigidly at 45° angle, short-petiolulate (3–5 mm), remote from the sterile pinnae, nearly as long as the longest (basal) sterile pinnae, the ultimate divisions with narrow lamina; spores tetrahedral, vertically compressed, striate,

the ridges broad and smooth with narrow grooves between, 79–99 (av. 89.9) μm diam. (Figs. 2E, F).

Anemia porrecta apparently has no close relatives and probably belongs to subg. *Coptophyllum* sect. *Tomentosae*. The stomata are attached, not floating. The epidermal cells are highly contorted, much like those of *A. elegans* of sect. *Trochopteris*, but the habit is quite unlike members of that group. It is readily identified by its rounded segments and rigidly held fertile pinnae at a 45° angle.

This study was supported in part by a grant from the National Science Foundation, DEB 82-09956. I am indebted to Donald Black for the SEM photomicrographs and Bobbi Angel for the drawings.

LITERATURE CITED

- MICKEL, J. T. 1982. The Mexican species of *Anemia* (Schizaeaceae). *Brittonia* 34:388–413.

REVIEW

“Arkansas ferns and fern allies,” by W. Carl Taylor. 1984. 262 pp. Milwaukee Public Museum. ISBN 0-89326-097-5. \$29.95.

This excellent treatment stands, along with R. H. Mohlenbrock’s “The Illustrated Flora of Illinois: Ferns” and T. M. C. Taylor’s “Pacific Northwest Ferns and Their Allies,” among our most beautiful and useful pteridophyte floras. The introductory material on fern morphology, life history, names, and Arkansas geology and fern distribution makes the book entirely comprehensible to neophytes to fern study. The key to genera is thoughtfully illustrated with an example of each genus, and so it is virtually impossible to go wrong at this critical point in making an identification. Seventy-two species in 31 genera are treated. Each species has a short description, brief list of synonyms, statement of habitat and range, and useful notes. The notes include cytological and hybridization information and, in the case of rare or newly discovered species, some information about the plants’ discovery. Distribution maps (one dot per county) are included for each taxon, as are very brief specimen lists that provide documentation for the maps. The illustrations, by Paul W. Nelson, are among the best published for United States pteridophytes. Many seem to have been drawn from life. All are reproduced clearly and in large size. The book concludes with an ample glossary, literature cited, a checklist of Arkansas pteridophytes, and an index to common and scientific names. The book is available from the Publications Division, Milwaukee Public Museum, 800 W. Wells St., Milwaukee, WI 53233. Everyone interested in the pteridophytes of the south-central United States or who enjoys excellent illustrations of pteridophytes will want to own a copy.—DAVID B. LELLINGER, Department of Botany, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560.